REMARKS

Reconsideration of the above-identified application in view of the following remarks is respectfully requested.

A. Status of the Claims

Claims 1, 3, 5-6, 8-10, 12-15, 17-18 and 20-26 are pending, and were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,059,943 to Murphy et al. in view of U.S. Patent No. 5,147,722 to Koslow ("Koslow"). [08/09/078 Office Action at pp. 2-3]. No amendments to the claims are made by this paper.

B. Claims 1, 3, 5-6, 8-10, 12-15, 17, 20, And 22-25 Are Patentably Distinct From The Cited References

The rejection of claims 1, 3, 5-6, 8-10, 12-15, 17, 20 and 22-25 is respectfully traversed. Neither Murphy nor Koslow discloses an ion exchange resin filling the porous structure of a polymeric sheet. Accordingly, a *prima facie* case of obviousness has not been made and the Section 103 rejection should be withdrawn.

Specifically, Applicants' claim 1 recites:

"1. An integral, substantially air impermeable polymeric membrane for use in an electrochemical apparatus or process comprising:
a) a polymeric sheet comprising polymer and having a porous structure with a microstructure of fibrils,
b) the polymeric sheet having distributed in the polymer:
i) metal;

ii) an organic polymer; or

iii) a combination thereof, and

c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process."

Murphy is directed to a composite membrane that allegedly is suitable for use in electrochemical devices and is made from two components. The "composite membrane consist[s] of [1] an inorganic component, active for the conduction of protons or other cations, bound together by [2] a polymeric binder phase, which may, or may not, be an ionic conductor." [10/40-43 (numerals added)]. The inorganic component comprises solid oxide particles, and not a polymer resin. [8/47-51; 10/50-64]. These oxide particles are "[a]lternatives to polymer proton conductors." [2/65-66].

The polymeric binder phase can be a porous polymer matrix. [9/9-12]. Preferably, the matrix is selected from "perfluorosulphonic acid, polytetrafluoroethylene, perfluoroalkoxy derivative of PTFE, polysulfone, polymethylmethacrylate, silicone rubber, sulfonated styrene-butadiene copolymers, polychlorotrifluoroethylene (PCTFE), perfluoroethylenepropylene copolymer (FEP), ethylene-chlorotrifluoroethylene copolymer (ECTFE), polyvinylidenefluoride (PVDF), copolymers of polyvinylidenefluoride with hexafluoropropene and tetrafluoroethylene, copolymers of

ethylene and tetrafluoroethylene (ETFE), polyvinyl chloride, and mixtures thereof." [8/58-9/6; see also 11/1-15 (Table II)].

Illustrative is Murphy's example 1, which discloses a composite membrane made from a porous PTFE filter that is provided in its pores with zirconium phosphate, i.e., the inorganic solid particle proton conductor. [31/29-61]. The inorganic proton conductor is not distributed into the PTFE polymer itself. An ion exchange resin is not described as being included in the pores of the PTFE membrane in this example.

The Office Action asserted that Murphy discloses that "the porous structure is at least partially filled with an ion-exchange ***particles*** [sic] to provide ionic conductances" and cited to claim 1. [8/9/07 Office Action at p. 2 (emphasis added)].

Murphy's claim 1 recites a composite membrane having (1) a solid inorganic particle component active for the conduction of protons or other cations and (2) a polymeric binder phase:

> "1. A cation-conducting, essentially gas impermeable composite membrane, comprising ***a polymeric matrix*** filled with ***inorganic oxide cation exchange particles*** forming a connected network extending from one face of the membrane to another face of the membrane." [14/12-16].

The Office Action fails to identify whether it is the polymer matrix or whether it is the inorganic oxide cation exchange particles that are said to correspond to Applicants' "ion-exchange resin." Neither does.

The polymer matrix material can be porous, and can be formed from ion exchange resins, such as Nafion®. [9/9-12; 11/1-15]. At best, the porous, polymer matrix material itself is an ion exchange resin. Murphy never teaches that ion exchange resin at least partially fills the porous structure of a polymer matrix material.

The office action suggests that Murphy's composite membranes have a porous structure filled with "ion-exchange particles." [8/9/07 Office Action at p. 2]. The inorganic oxide cation exchange particles of Murphy are described as being ***alternatives*** to polymer resins. [2/65-66]. Accordingly, although these particles may fill the pores of the polymer material in some embodiments, the inorganic particles are not an ion-exchange resin.

Thus, Murphy fails to teach, disclose or suggest "c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process" as recited in Applicants' claim 1.

Koslow is directed to a process for the production of a composite membrane. Per Koslow, a "binder material" and "a primary material" are combined and formed into a continuous web matrix. The "binder material" can be nearly any thermoplastic material. [7/59-60]. The "primary material" or "primary particles" can include ion exchange resin. [8/66-9/6].

Koslow's Examples 17-22 disclose embodiments where ion-exchange resin is incorporated into a composite structure. Mixtures are prepared from (1) minor amounts of binder resin (17 weight percent or less), (2) one or more stainless steel powders, ion-exchange resin, and chopped cellulose or acrylic fibers. [29/20–31/39]. An ethylene-vinyl acetate copolymer (EVA) binder resin is used in Example 17. These mixtures are subjected to a continuous web matrix (CWM) process described by Koslow, which is said to render the binder in a "continuous form or forced point-bonded condition" such that the final composite is composed of "primary particles, a binder resin phase forming a continuous web matrix or point bonds, and a volume of empty pores." [Koslow, Abstract].

Said differently, the formerly discontinuous starting materials are processed "to form a continuous web matrix or forced point-bonds." [1/23-27; see also 4/38-40]. Koslow teaches that "[t]he primary particles or fibers are entrapped and immobilized within this continuous binder resin matrix and are sometimes bonded to the structure formed from the binder resin." [5/24-27]. At best, the ion-exchange resin beads (i.e., the primary particles) may be incorporated into his polymeric mixtures, but these ion-exchange resin beads are ***not*** within the pores of the final composite.

The Office Action does not disagree, and asserts only that Koslow "teaches a polymeric membrane comprising ion-exchange resin (col. 25, lines 15-35) wherein the

polymeric sheet has silica or fumed silica distributed therein (col. 16, lines 65-67, and col. 17, lines 1-7)."

The citation to column 25 relates merely to ***potential uses*** for the resulting composite membrane and does not describe an ion-exchange resin at least partially filling the pores of the porous structure of a polymer matrix:

> "Materials produced by CWM and FPB processing are useful in a wide range of applications, including: ... production of sorbent structures such as molded, extruded, or roll compacted forms of ... ion-exchange resins, and mixtures of various sorbent particles;" [25/15-28].

Koslow does not teach, disclose or suggest "c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process" as recited in Applicants' claim 1.

Accordingly, as Applicant cannot find in Murphy or Koslow a disclosure of "c) said porous structure being at least partially filled with an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process" as recited in Applicants' independent claim 1, that independent claim is respectfully asserted to be in condition for allowance. Independent claims 5, 10, and 20, and dependent claims 3, 6, 8-9, 12-15, 17 and 22-25 are asserted to be patentably distinct for at least similar reasons.

C. **Claims 18, 21 and 26 Are Patentably Distinct From The Cited References**

The rejection of claims 18, 21 and 26 also is respectfully traversed. Neither Murphy nor Koslow discloses a polymeric gel that contains electrolyte filling the porous structure of a polymeric sheet, which requires withdrawal of the Section 103 rejection.

Specifically, Applicants; claim 18 recites:

> "18. A composite membrane for use in an electrochemical apparatus or process comprising:
> a) a polymeric sheet comprising polymer and having a porous structure and a thickness of less than 50 microns,
> b) said polymeric sheet having distributed in the polymer inorganic particulate, metal, or a combination thereof;
> c) said porous structure being substantially filled with a polymeric gel that contains electrolyte to provide ionic conductance for use in the electrochemical apparatus or process."

As discussed above, Murphy's composite membranes at best are filled with non-polymeric, inorganic particles. There is absolutely no disclosure in Murphy that "a polymeric gel that contains electrolyte" substantially files a porous structure of a polymeric sheet as recited in Applicants' claim 18. Likewise, Koslow is silent as to such usage of a polymeric gel. Indeed, the office action fails to address the polymeric gel language of Applicants' claim 18.

Accordingly, as Applicant cannot find in Murphy or Koslow a disclosure of "c) said porous structure being substantially filled with a polymeric gel that contains

electrolyte" as recited in Applicants' independent claim 18, at least that independent claim is respectfully asserted to be in condition for allowance. Dependent claims 21 and 26 are asserted to be patentably distinct for at least similar reasons.

Applicants have chosen in the interest of expediting prosecution of this patent application to distinguish the cited documents from the pending claims as set forth above. These statements should not be regarded in any way as admissions that the cited documents are, in fact, prior art. Likewise, Applicants have chosen not to swear behind Murphy, cited by the office action, or to otherwise submit evidence to traverse the rejection at this time. Applicants, however, reserve the right, as provided by 37 C.F.R. §§ 1.131 and 1.132, to do so in the future as appropriate. Finally, Applicants have not specifically addressed the rejections of the dependent claims. Applicants respectfully submit that the independent claims, from which they depend, are in condition for allowance as set forth above. Accordingly, the dependent claims also are in condition for allowance. Applicants, however, reserve the right to address such rejections of the dependent claims in the future as appropriate.

CONCLUSION

For the above-stated reasons, this application is respectfully asserted to be in condition for allowance. An early and favorable examination on the merits is requested. In the event that a telephone conference would facilitate the examination of this application in any way, the examiner is invited to contact the undersigned at the number provided.

THE COMMISSIONER IS HEREBY AUTHORIZED TO CHARGE ANY ADDITIONAL FEES WHICH MAY BE REQUIRED FOR THE TIMELY CONSIDERATION OF THIS AMENDMENT UNDER 37 C.F.R. §§ 1.16 AND 1.17, OR CREDIT ANY OVERPAYMENT TO DEPOSIT ACCOUNT NO. 13-4500, ORDER NO. 0769-4624US5.

Respectfully submitted,
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